Clinical Proceedings

of the

CHILDREN'S HOSPITAL

WASHINGTON, D. C.

VOL. I OCTOBER, 1945 No. 11

SHOULD VITAMIN D BE GIVEN ONLY TO INFANTS?

VITAMIN D has been so successful in preventing rickets during infancy that there has been little emphasis on continuing its use after the second year.

But now a careful histologic study has been made which reveals a startlingly high incidence of rickets in children 2 to 14 years old. Follis, Jackson, Eliot, and Park* report that postmortem examination of 230 children of this age group showed the total prevalence of rickets to be 46.5%.

Rachitic changes were present as late as the fourteenth year, and the incidence was higher among children dying from acute disease than in those dying of chronic disease.

The authors conclude, "We doubt if slight degrees of rickets, such as we found in many of our children, interfere with health and development, but our studies as a whole afford reason to prolong administration of vitamin D to the age limit of our study, the fourteenth year, and especially indicate the necessity to suspect and to take the necessary measures to guard against rickets in sick children."

*R. H. Follis, D. Jackson, M. M. Eliot, and E. A. Park: Prevalence of rickets in children between two and fourteen years of age, Am. J. Dis. Child. 66:1-11, July 1943.

THE ERYTHROCYTE SEDIMENTATION RATE AND ITS APPLICATIONS TO PEDIATRICS

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An attempt has been made in this article to review and correlate the pertinent literature on the use of the sedimentation rate in pediatrics and its value in various pediatric problems.

Types of Sedimentation Tests

In the following chart some of the more common tests are enumerated.

Author	Method	Units of measure	Correction for vol. of RBC	Normal values
Cutler, Am. J. M. Sc., **171:** 882 June '26	Distance of fall plotted for one hour at one minute intervals.	Slope of curve mm. in 1 hr.	none	Horiz. line, men 8 mm. in 1 hr., women 10 mm. in 1 hr.
Cutler, Am. J. M. Sc., **173:** 687, May 1927	Micro method using capillary blood but otherwise same as above.			
Kato, Am. J. Dis. Child., **59:** 310, Feb. '40.	Micro using capillary blood. Distance of fall in 1 hr.	% in 1 hr.	none	Norm. range 0-20%
Landeau, Am. J. D. C. 45-691, April '33	Distance fall in 1 hr. Orig. length of column of blood is 62.5 mm.	mm. in 1 hr.	none	Child under 2—1-6 mm. in 1 hr. Child over 2—1-9 mm. in 1 hr.
Rourke, & Ernstein, J. Clin. Inv. **8:** 545 June '30	Veloc. of fall during period of most rapid sedimentation	mm. per min.	Required	0.08-0.35 mm./min.
Smith, Am. J. M. Sc., **192:** 73, July '36	Micro. method using capillary blood. Distance of fall in ½ hr. and 1 hr.	mm. in ½ hr. and 1 hr.	Hematocrit reading reported with sed. rate	Infants and children 1-8 mm./½ hr.; 3-13 mm./hr.
Walton, J. Lab. & Clin. Med. **18:** 711, April '33	Distance of fall in 1 hr.	mm. in 1 hr.	Correction by graph.	men 0-5.5 mm./hr. averaging 2.5; women 0-5.5 mm./hr. averaging 3.5.
Westergren Am. Rev. Tuberc. **14:** 94 July '26	Distance of fall in 45 min.	mm. in 45 min.	none	upper limits 15 mm. in 45 min.; mean 10 mm.
Wintrobe & Lansberg	Distance of fall in 1 hr.	mm. in 1 hr.	Required	Upper limit 10 mm. in 1 hr.

Goldberger [2] devised a rapid bedside technique for determining the sedimentation rate. The finger is pricked and three drops of blood are touched to three places on the under surface of a clean glass slide. The slide is then righted and the blood is allowed to clot and dry. When the blood has dried the slide is observed macroscopically by holding the slide up to a light.

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Criteria for reading

1) Fineness or coarseness of the general detail.
2) Character of the meshwork if present.
3) Presence or absence of central agglutination.
4) Presence or absence of peripheral rings.

Readings

1) Normal—fine detail, no meshwork, a gradual transition from periphery to a central dark agglutinated mass.
2) Mod. Rapid—detail somewhat coarse but uniform throughout, meshwork not particularly noticeable, there may be the beginnings of a central agglutinated mass.
3) Rapid—coarse detail, the meshwork is fine but easily observed, no central agglutinated mass.
4) Very Rapid—very coarse detail, a definite meshwork and no central agglutinated mass.

Goldberger has checked this method of determining the sedimentation rate against coronary thrombosis, rheumatoid arthritis and salpingitis and has found it a good qualitative gauge.

Trough[3] has devised a micro method of determining the sedimentation rate in which the blood is drawn by a finger puncture. It necessitates the use of a special tube and pipette. It is read at one-half and one hour. The normal values are: one-half hour—0.5 mm.; one hour—1–10 mm. In 22 cases of acute rheumatism a one-hour value (average) of 20 mm. was obtained. In 4 cases of chorea the average one-hour reading was 11 mm., and in 4 cases of rheumatic fever carditis the average reading at one hour was 8 mm. This investigator states that the moderately acute cases give readings of 8 mm. at one-half hour and 14 mm. at one hour, and the gravely acute cases give readings of 20 mm. at one-half hour and 30 mm. at one hour.

Another method of determining the sedimentation rate is Linzenmeier's technique, which records the time required by a column of erythrocytes to fall 6, 12, or 18 mm.; normal sedimentation requires 250 min. to descend to the level of 18 mm. This is a micro sedimentation method.[4]

Smith[5] also has devised a micro sedimentation method in which he uses blood from the heel of an infant or from the finger of an older child. In this test as a means of avoiding correction charts he suggests that the cell volume also be reported with the sedimentation rate.

Theories Advanced to Account for Changes in the Sedimentation Rate

Therasse and Willaert[4] state that apparently the reaction is due to a biologic phenomenon of plasmadic origin. Colloidal reactions probably play a role. Fahraeus[6] showed that erythrocytes with identical electrical loading repulse one another and therefore are diffusely distributed in a liquid, contrary to erythrocytes with opposite, or neutral loading. The

sedimentation speed increases when the contents of electropositive proteins in the blood increase; fibrinogen and globulin are such products accelerating sedimentation. Burker's[6] physical theory says that the weight of erythrocytes which depends on their size and the amount of hemoglobin is the determining factor in acceleration of sedimentation.

Hirsch[7] says that the sedimentation rate is increased by the presence of a foreign protein in the circulation; in pregnancy it is due to the protein of fetal catabolism, in infection it is the bacterial protein, and in malignancy or coronary occlusion it is due to the protein of necrotic tissue. Kopp[8] found in a study of five patients undergoing fever therapy that there was no definite relation between fibrinogen, albumen, albumen-globulin, or globulin-fibrinogen ratios and the corrected sedimentation rate. He did note, however, that the corrected sedimentation rate was increased in most instances when the globulin value rose to the upper limit of normal (3 gm. per cent) and above, regardless of the fibrinogen levels.

Normal Sedimentation Rate Values in Pediatrics

Liege, Grodnitzky and Herr[9] report that by the Linzenmeier technique in infants under one year of age the sedimentation is retarded. In children 1–2 years of age it averages 3–5 mm.; 2–5 years, 3.5–8 mm.; 10–15 years, 4–8 mm. Friedlander[10] reports that with the Langer-Schmidt micro method the normal values fall within 0–10 mm.

Kitamura[11] made a study of the relationship between the sedimentation rate of normal youths and their ages, race and blood type in over 5,000 patients. He found that in comparing the four blood types, type AB had the fastest sedimentation rate, type A the next most rapid, then B, followed by type O which had the slowest. The difference between any two successive types was small but the difference between AB and O was definitely significant. He found that in girls between 12 and 16 years the sedimentation rate increases slightly and then decreases after 16, whereas in boys up to the age of 22 the rate decreases gradually, almost directly in proportion to the age.

Sources of Error

Ham and Curtis[12] state that the sedimentation rate depends on the following technical factors, any one of which, if incorrect, can give a false reading:

1) The height of the blood column.
2) The internal diameter of the sedimentation tube.
3) The type of anticoagulant.
4) The temperature of the room when the test is done.
5) The inclination of the tube.
6) The effect of standing.

Nichols[13] believes that the anticoagulant used is one of the greatest of the sources of technical error and found that a mixture of potassium and ammonium oxalate was the best anticoagulant, since it gave less distortion to the sedimentation rate.

Therasse and Willaert[4] find that when the blood specimen is obtained the pressure on the arm should be of very short duration, since stasis may produce the onset of sedimentation in vivo; furthermore the time when the specimens are obtained is of great importance because the physico-chemical composition of the blood changes after meals or rest and thus may cause an error in the interpretation of the results. They also state that fatigue, intercurrent lesions, meals, rest, etc., may affect the sedimentation speed.

The Value of the Micro Sedimentation in Pediatrics

One of the advantages of this test is that the need for withdrawing blood from the veins is avoided. It is particularly advantageous in obese children and infants where it is often difficult to find a vein and where it is desirable to spare these vessels for more important therapeutic procedures. Since the value of the sedimentation test usually depends on repeated readings at frequent intervals it has become not only desirable to simplify the technical steps involved in the actual test but to develop a method requiring minimal amounts of blood which could be withdrawn from the tip of the finger as for an ordinary blood count.

Diseases in Which the Sedimentation Rate is of Diagnostic or Prognostic Value

Tuberculosis

Liege et al.[9] found that the sedimentation rate is increased in nearly every case of tuberculosis of the glands or lungs. The highest elevations of the sedimentation rate were found in the most serious forms of tuberculosis but exceptions were reported. In pulmonary tuberculous lesions with an unfavorable course, the sedimentation rate continued to increase. Relatively high figures were found in sero-fibrinous pleurisy while pericarditis modified the speed only slightly. In tuberculous meningitis the sedimentation rate is not always elevated; in seven children with this disease the highest figures were 27.5 mm. (normal 4–8 mm.). This is lower than the readings found in pleurisy, chronic caseo-ulcerative pulmonary tuberculosis or tracheobronchial adenopathies. If the evolution of the tuberculous process is favorable, the sedimentation rate decreases as the disease improves.

Friedlander[10] in a study of 100 cases of tuberculosis found that 17 of the 48 cases classified as active pulmonary tuberculosis and proven by demonstration of the bacilli had normal sedimentation rates throughout their course. This investigator believes that a distinct rise in the sedimentation

rate calls for a guarded prognosis. If the micro sedimentation figure in a pirquet-positive child is found to be repeatedly normal it supports the assumption of a latent process. He believes that the practical applicability of the method will largely concern those cases in which it may lend additional support to the clinical evidence of a latent tuberculosis. In the 33 cases diagnosed as latent tuberculosis, the sedimentation rate was normal in all. Friedlander concludes that the micro sedimentation test furnishes a valuable supplement to other clinical examinations but warns that a normal sedimentation rate does not exclude the possibility of an active tuberculous process.

Dawydow[15] examined 82 tuberculous children ranging in age from six months to seven years, of whom 6 had an active form of pulmonary tuberculosis, 14 tuberculosis of the bones, 27 cervical lymphadenitis, and 35 enlargement of the mediastinal glands. He found relatively low sedimentation rates in children with a mild tuberculosis of the bones, whereas among the 27 children with tuberculosis of the lymphatic glands, those with bilateral enlargement gave the highest elevation. The results of the sedimentation rate corresponded to clinical signs and confirmed the importance of tuberculin test in cases with enlargement of the glands. The author concludes that the sedimentation test is a suitable diagnostic test supplementing other clinical methods; it also has a prognostic value and may be used as a criterion of the course of the disease. An increase in the rate points to certain complications and toward a tendency to aggravation of the lesions.

Kosakow[6] states that in tuberculosis the acceleration of the rate is in relation to the gravity of the condition, the exudative forms furnishing the highest figures. He used Pontschenkow's method and the results were recorded every 15 minutes for an hour and a half in the form of a curve. If the elevation in the sedimentation rate occurs is one of the first 15-minute periods it is recorded as a shifting to the left while an elevation in one of the last 15-minute periods is a shifting to the right. The authors found that there seemed to be a relation between the speed of sedimentation, the shifting to the left or right, and the vegetative sympathetic constitution. A slow sedimentation, right deviation, and a vagotonic constitution indicate a mild course of tuberculosis. Fast sedimentation, left deviation and a sympathetico-tonic constitution are observed in grave forms of tuberculosis, while slow sedimentation with very slight elevation of the curve and vagotonic constitution are found in the terminal stages of tuberculosis.

McLean[16] states that in tuberculosis the sedimentation rate parallels the degree of activity of the disease, but warns that one increased sedimentation rate should never be taken as conclusive. On the other hand, Banyai and Cadden[17] in a study of 2,640 tuberculous patients found that 8% of them had normal sedimentation rates and in their opinion, the sedimentation rate

does not parallel the type and extent of the tuberculous process. They conclude that the clinical value of the sedimentation rate in tuberculosis is overestimated and that it should not be used as an independent index in the management of tuberculous patients. Day[18] in a study of 6 cases of pulmonary and pleural tuberculosis found that the sedimentation rate drops in cases making a clinical recovery by roughly equal amounts each month until a normal rate is reached, and this can be used to determine the patient's progress rate.

Landau[19] in a review of 900 cases receiving B.C.G. vaccine found that the sedimentation reaction cannot be used in deciding whether the vaccine produces any results or not, since in most cases there was no essential change in the sedimentation rate.

Rheumatic fever

Klein, Levinson, and Rosenbloom[20] in a study of 110 cases of rheumatic fever in children and 10 cases of subacute bacterial endocarditis found:

1) That the sedimentation rate with chorea is usually normal, but at times may be increased. This increase may be related to a previous infection.
2) That acute rheumatoid arthritis and carditis is characterized by a rapid sedimentation rate, whereas the Weltmann reaction shows a low coagulation band. In this disease the coagulation band returns to normal before the sedimentation rate.
3) In cardiac decompensation the sedimentation rate tends to decrease, the coagulation band to increase.
4) An increased sedimentation rate does not always mean that the rheumatic fever is still active. In the convalescent stage (proliferative stage) the patient may have a rapid sedimentation rate.
5) The Weltmann reaction is of value in rheumatic fever, complementing the sedimentation rate, and may be of aid in the differential diagnosis between subacute bacterial endocarditis and acute rheumatic carditis.

Martin and Ellenberg[21] state that the sedimentation rate is of help in the evaluation of the status of rheumatic fever and is a useful guide in determining the period of convalescent care required by the patient. Weisz and Taran[22] in a study of 52 children with rheumatic heart disease by the Cutler fingertip method found that 33 had normal sedimentation rates, whereas 19 had increased sedimentation rates and showed signs of an active process. These investigators compared the Cutler micro fingertip method with four other methods and found a 90% correlation and therefore concluded that the micro method was as accurate and useful as the other methods with which it was compared. McKinley and Jackson[1] in a study

of 119 rheumatic fever patients found that the sedimentation rate had great value in evaluating the severity of the disease process.

Lichty and Hooker[23] studied patients receiving acetyl salicylic acid for the treatment of rheumatic fever and found that if the patient was taken off the drug as soon as the sedimentation rate had become normal, the latter increased with an average rise of 0.6 mm. per minute (Rourke-Ernstein). These investigators believe that the drug may have a slowing effect on the sedimentation rate and thereby give rise to a false impression that the disease process is inactive.

Bendien, Newberg, and Snaffer[24] added sodium salicylate to blood in vitro and report a slowing of the sedimentation rate.

Malignancies

Hirsch[7] states that the sedimentation rate is elevated in all malignancies and may be considered a good criterion for prognosis after surgical removal of the malignancy. If the sedimentation rate returns to normal and remains so for six months after surgery, a more favorable prognosis is in order; however, if the sedimentation rate rises again during this interval it is probable that there is either a local recurrence or a metastasis. Wolfson, Reznick and Gunther[25] report that the sedimentation rate is markedly increased in malignancy of bone and believe that there is a definite correlation between the sedimentation rate and the degree of involvement of the bone. McLean[16] cites the case of a four-year old boy with fibrosarcoma of the femur who had 18 sedimentation rates done over an 8-month period and only in two cases was the sedimentation rate normal. The average was about 22 mm. (normal 1–9 mm.).

Wise[26] reports on 17 patients with Hodgkin's disease, and says the sedimentation rate is usually elevated in this disease but may be normal during periods of relative inactivity of the disease process. The sedimentation rate may be useful as a guide both in following the course of Hodgkin's disease and during therapy.

Birth crisis in the blood of newborn

Eichwald[27] postulates that the crises found in the umbilical blood as well as in the peripheral blood of the newborn shows a definite causal relationship to the degree of difficulty of the labor. He believes that this change in the blood picture is probably due to hemorrhages and to the irritation of the blood in these internal hemorrhages. It was found that the sedimentation reaction of the umbilical blood was considerably accelerated in the cases where the labor was difficult and was most pronounced on the third day of life. The author concludes that there is a definite relationship between the degree of difficulty of the labor, the shift to the left in the blood picture, and

the acceleration of the sedimentation rate. These are not found in an uneventful, easy labor.

Acute infections

Scarlet fever. Cookson[28] in a study of 76 cases of scarlet fever found only a small number of normal sedimentation rates as early as the 24th day of the disease. In most cases in which complications developed, the sedimentation rate reached at the time of the complication was far in excess of the readings at the beginning of the disease. A fast sedimentation rate on the 14th day of the disease was construed as indicating that complications have already developed or would subsequently appear. The erythrocyte sedimentation rate was useful in differentiating types of albuminuria in the course of the disease; a high rate usually meant that the patient had nephritis. The rate was also found to be a useful index of the efficacy of the treatment.

Press, Kozinn and Litvak[29] in a study of 52 cases of scarlet fever found a markedly elevated sedimentation rate in most cases classified clinically as severe scarlet fever and that complications occurred with greater frequency and severity in cases with higher sedimentation rates on admission. They concluded that the admission sedimentation rate is a better index of those cases likely to develop complications than the clinical classification.

Acute glomerulonephritis. Rugin et al.[30] in a study of 40 patients found a close correlation between the slowing of the sedimentation rate and recovery from the disease. Similarly there was a correlation between the return of the sedimentation rate and Addis count to normal, the Addis count returning about 5 weeks after the sedimentation rate. Of considerable prognostic significance is the return of both to normal levels for several weeks.

Acute appendicitis. Lesser and Kaufman[31] in a five-year study of the sedimentation rate in acute appendicitis reviewed 132 cases operated on with a preoperative diagnosis of acute appendicitis. In 15 cases the diagnosis was wrong and these all showed a very high sedimentation rate. In 99 cases diagnosed as acute appendjcitis which were confirmed by operation, 90 had a sedimentation rate of 15 mm. or less per hour (Westergren) while in the remaining 9 cases the sedimentation rate was between 21 and 26 mm. A consistently normal sedimentation rate in acute appendicitis has been corroborated in more than 90% of the cases covering a 5-year period. A small percentage of cases showed a slight increase above normal, probably due to minor deviations in technique. The sedimentation rate may be considered of definite value in the differential diagnosis of acute appendicitis.

Diarrhea. Alvarez and Bargen[33] found that the sedimentation rate is of value in differentiating functional and organic lesions of the bowel. If the value is low there is little chance that an organic lesion will be found, but if

high (40–50 mm. per hour Westergren) it is likely that there is an organic lesion in the bowel.

Acute poliomyelitis. Rosen, Frank and Hamilton[34] in a study of 96 cases of acute poliomyelitis found that white blood counts above 16,000 and sedimentation rates in excess of 13 mm. above normal (Wintrobe) are uncommon. They state that in the differential diagnosis between poliomyelitis and acute rheumatic fever the sedimentation rate and the white count may be of value. In the individual case of poliomyelitis, however, there is no correlation between the severity of the disease and the sedimentation rate and white blood count.

Changes in the acid-base balance

Moschini[35] believes that the acid-base equilibrium of the blood plays an important part in the maintaining of the colloidal equilibrium of the plasma, and that the true cause of the variations in the sedimentation rate must be sought in modifications of the plasmadic colloidal equilibrium. In his experiments made on 81 children suffering from various diseases, he employed the Westergren method for the sedimentation rate determination and the Van Slyke test for the alkaline reserve. An analytic study of the single cases where the results were checked carefully over certain periods showed that, in nephritis for example, there exists an inverse relation between the alkaline reserve and the sedimentation rate. By way of explanation the author states that the H and OH ions act on the colloids and influence the colloidal dispersion of the plasma proteins by virtue of their electrical properties. The plasma proteins which behave in the manner of amopholytes are ionized and become positive or negative depending upon the reagent. If the reagent is acid, the H ion predominates and the proteins are positive, absorbing and neutralizing the red blood cells with negative charge, and reducing the reciprocal repulsion. Consequently the sedimentation rate is accelerated. If the reagent is alkaline and the OH ions predominate the plasma proteins are charged negatively. As a result they do not absorb the red blood cells but retain their charge and their reciprocal repulsion, thus slowing the sedimentation rate.

Other diseases

The sedimentation rate in children is usually increased in acute inflammatory and infectious diseases, syphilis, malaria, Addison's disease, hypothyroidism, and certain types of jaundice and anemia[16].

Summary

The following conclusions concerning the sedimentation rate in pediatrics may be drawn:

1. That the micro sedimentation tests are definitely indicated in pediatrics, because of the increased facility in obtaining capillary blood and because there is little if any variation in accuracy between the micro sedimentation and the macro sedimentation tests.

2. That in tuberculosis in children the sedimentation rate is a fairly good indication of the course of the disease. A low sedimentation rate usually is indicative of a latent or mild infection, whereas increasing sedimentation rate values are usually a sign that the process is advancing. It is to be remembered, however, that a normal sedimentation rate does not preclude the possibility of an active infection.

3. That in acute rheumatic fever the sedimentation rate is usually greatly accelerated, while in chorea it is usually normal. In cardiac decompensation there is a tendency to slowing of the sedimentation rate. An increased sedimentation rate does not always mean that the rheumatic process is still active, since in the proliferative stage there may be a rapid sedimentation rate. The sedimentation rate is a valuable index for following the course of the disease and determining the period of convalescent care required by the patient.

4. That because of the slowing effect of salicylates on the sedimentation rate a false impression may be obtained that the disease process is inactive, before it actually is so.

5. That in malignancies of all types the sedimentation rate is usually elevated and becomes a good prognostic indication after the surgical removal of the malignancy. This is especially true of bone malignancies.

6. That in Hodgkin's Disease the sedimentation rate is usually elevated and is useful as a guide both in following the course of the disease process and during therapy.

7. That after a difficult delivery in which there is a possibility of hidden hemorrhages, the sedimentation rate is usually increased if hemorrhage has occurred. There is also usually a shift to the left in the blood picture.

8. That in scarlet fever the sedimentation rate is nearly always increased and that a rise in sedimentation rate during the course of the disease should lead one to suspect complications. The sedimentation rate may be a useful index in determining the efficacy of the therapy.

9. That in acute glomerulonephritis there is a close correlation between the return of the sedimentation rate to normal and recovery from the disease.

10. That in acute appendicitis the sedimentation rate is nearly always within normal limits and therefore may be of some value in the differential diagnosis of the acute surgical abdomen.

11. That the sedimentation rate is of possible significance in differentiating functional and organic lesions of the bowel. If the value is low an organic lesion is unlikely.

12. That in the individual case of poliomyelitis there is no correlation between the severity of the disease and the sedimentation rate and white count. In a study of a group of cases, sedimentation rates in excess of 13 mm. above normal (Winthrobe) are uncommon.

13. That there is correlation between the acid-base equilibrium and the sedimentation rate. In general the sedimentation rate is decreased in alkalosis and accelerated in acidosis.

14. That the sedimentation rate is also usually accelerated in syphilis, malaria, Addison's Disease, and hypothyroidism.

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PSYCHOMETRICS IN PEDIATRICS

Hanna Colm, Ph.d.*

Mental testing has been in use for about fifty years. In its early stages it was exclusively quantitative. More recently psychologists recognized the importance of a person's environment, social relationships, and life experience to his mental functioning. Psychology slowly began to measure mental development not in terms of a quantitative I.Q. but rather to evaluate intellectual and emotional development in terms of the whole personality and often the family picture. Tests such as the Rorschach and the Mosaic tests offered a means to measure and evaluate the intellectual and emotional structure of an individual. These tests measure the deviation of a person's mental functioning from the normal and as such became a diagnostic tool for clinical use.

For two years these methods have been used in the Psychological Service of Children's Hospital. This service has attempted to be of help to the medical departments of the hospital mainly in three types of cases:

1. for children whose mental evaluation seemed of value in the medical diagnosis,
2. for children who show physical symptoms caused by emotional difficulties,
3. for children who present neurological problems.

Frequently children whose mental evaluation seems of value in the clinical diagnosis are referred for psychological examinations. Mothers bring children to the Dispensary because they are "late in talking" or "do not seem to understand" or "act queer." The mother feels some physical shortcoming might be the cause and asks for medical advice. If a thorough medical examination does not demonstrate any physical basis for the complaint the child is sent for a psychological examination.

Each child referred to the Psychologist for mental evaluation receives a series of tests† and his home background and life experience are studied. Intelligence testing alone can easily lead to a wrong or incomplete diagnosis. Very often, children appear to be mentally deficient who only *function* poorly in spite of a normal mental endowment. Therefore, the psychological examination must include testing of emotional factors. The tests project with high accuracy emotional factors (such as anxiety) which interfere

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† Emotional projective tests used are: Rorschach, Wertham Mosaic Test (Queen's Hospital, N. Y.), Thematic Aperception Test (Harvard Psychological Clinic). Intelligence tests used are: Binet, Merrill Palmer, Gesell Developmental Scales, Stutzman Performance.

with a child's intellectual performance and may cause difficulties in concentration, reading disabilities, etc. Emotional disturbances indicated by the tests are then traced in the child's history and family background. This study of the causes of the disturbance gives the basis for psychological treatment.*

L. R.† was a typical case who was referred to the psychologist for help in diagnosis of a physical symptom probably caused by emotional difficulties. She was referred from the Ear, Nose and Throat Clinic because of difficulty in hearing. The physical examination was negative. A psychological examination suggested a hysterical basis for the child's symptoms. An interview with her mother contributed the background and understanding for the development of the girl's emotional difficulties. After four months of treatment the patient's hearing returned to normal.

Another patient, M. F.,‡ was referred to the psychologists because of frequent abdominal pain for which exhaustive tests revealed no physical basis. The psychological examination suggested a neurotic etiology. The interview with the mother again yielded an understanding of the patient's emotional need for repeated pain in her abdomen. The child and her mother came for treatment, and the patient's symptoms disappeared. A third patient, A. S.,§ was unable to talk. The physical examination was negative. The psychological examination showed neurotic development and the patient's history suggested possibilities which could have caused it. The child remained under treatment and she eventually regained her speech.

Psychometrics can be of diagnostic aid in neurological problems. In children who show the strange behavior frequently seen in organic disorders, psychological tests and a study of the home background can confirm the neurologist's diagnosis of an organic disorder. The psychologist can aid in determining the temporary and permanent damage to the child's mentality caused by a disease. He sees convulsive children and evaluates the damage done to the intelligence of the child by his convulsions.‖ The rate of deterioration is determined by repeated examinations. It is also usually possible to determine the rate of recovery in the case of children who are treated for brain tumors or other brain involvement.

* H. Rorschach, *Psychodiagnostics*, Grune and Stratton, Inc., 1941. Carl Rogers, *The Clinical Treatment of the Problem Child*, Houghton, Mifflin Company, 1939 (Rochester Guidance Center). Frederick H. Allen, M.D., *Psychotherapy with Children*, W. W. Norton and Co., 1942 (Philadelphia Child Guidance Clinic).

† Chart #32-396.

‡ Chart #34-4133.

§ Chart #36-2553.

‖ Suzanne Reichard and Roy Schafer, *The Clinical Significance of the Scatter on the Bellvue Scale*, Bulletin of the Menninger Clinic, Vol. 7, No. 3, May, 1943. David Wechsler, *The Measurement of Adult Intelligence*, Williams & Williams Co., Chapter: Diagnostic and Clinical Features.

In these neurological cases the psychologist does not depend on psychometrics exclusively. The child's general mental and emotional development has to be taken into account as the background on which the present difficulties can be evaluated.

The Psychological Department has been able to make its special contribution at Children's Hospital because of the close cooperation between the physician and the psychologist.

SPLENIC NEUTROPENIA

Case Report No. 35

Dr. Mead L. M.—43-5916

L. M., an eight year old white male, was admitted to the Children's Hospital on July 3, 1945 with the complaints of severe anorexia for two weeks, multiple bruises on both thighs for several days, and fever of one day's duration. This child had always bruised easily but otherwise had not manifested any gross hemorrhagic tendencies. There was no history of drug ingestion. The delivery and neo-natal periods were uneventful. He had always had an adequate diet with a good vitamin intake. Development had been essentially normal. Past illnesses included chicken pox at 15 months, otitis media, influenza and pneumonia at 2 years of age and whooping cough. Adenoidectomy was performed at 2 years of age and tonsillectomy at 6 years of age.

His mother had a tendency to bruise easily, this constituting the only significant finding in the family history.

On admission the child had a temperature of 101.4°. He was a well developed, well nourished white male who appeared very pale and somewhat lethargic. There was generalized lymphadenopathy of a moderate degree and a large spleen which extended 6 cm. below the left costal margin; the liver edge was felt 4 cm. below the right costal margin. Large ecchymotic areas were scattered over the thighs. There were no petechiae or skin rashes. Physical examination was otherwise negative.

The initial hemogram revealed a Hgb. of 7 gms. with a red-cell count of 2,000,000. The white-cell count was 1,800, with 57% granulocytes (including 48% segmented cells, 6% bands, and 3% young forms), lymphocytes 14%, monocytes 23%, basophils 1%, unidentified 5%. Thrombocytes were absent. There was anisocytosis of the red cells but no poikilocytosis. The bleeding time was less than 1 minute and the coagulation time was $3\frac{3}{4}$ minutes. A bone marrow smear was normal except for a hypercellular appearance. The Kahn and Mazzini tests were negative and there was no agglutination with the common febrile antigens. Urinalyses showed 100 mg. albumin and several casts. Blood cultures were repeatedly sterile. A cephalin-flocculation test was negative, the icterus index was 9 units, and the prothrombin time was 100% normal. The blood cholesterol was 180 mgs%. An x-ray of the chest revealed considerable increase in bronchovascular markings throughout the parenchyma and slight enlargement of the heart with an abnormal left border. There was no evidence of mediastinal lymph node enlargement. X-ray examination of the long bones showed no

pathological changes. A barium swallow failed to reveal the presence of esophageal varices. A lymph node biopsy was contemplated but the nodes had diminished in size and no suitable node could be palpated by the second week after admission.

Despite repeated blood transfusions and daily administration of liver extract and pentonucleotide the child's condition remained essentially unchanged except for a moderate increase in the thrombocytes and some improvement in the degree of anemia (See Table 1).

The patient was discharged to the out-patient department on the 29th hospital day. The red-cell count at this time was 3,600,000 with 8.5 mms. Hgb. The white-cell count was 4,300 with a normal differential. Platelets numbered 100,000. One week later, on an out-patient department visit, the Hgb. had dropped to 7.0 gms., and the white-cell count was 3,400 with a normal differential.

On August 14, 1945, two weeks after discharge, the patient returned with an acute diarrhea having had 12 watery, non-bloody stools in 12 hours. Physical examination as on the previous entry revealed a marked hepatosplenomegaly, moderate pallor, and numerous ecchymotic areas on the thighs and lower extremities. A few shotty nodes were palpable in the axillary and inguinal regions. The child was seen in consultation at this time and a diagnosis of splenic neutropenia was considered the most likely possibility. Splenectomy was deemed advisable when the patient's general condition warranted it.

On the sixth hospital day the temperature rose to 104 and clinical signs of pneumonia developed. Penicillin, sulfadiazine, oxygen and whole blood transfusions were administered and after a critically ill 3 week period, the patient's condition improved sufficiently so that surgery could be contemplated. Pre-operatively the spleen was irradiated twice with x-ray, 100 r each time.

On September 12, 1945, the 30th hospital day, a splenectomy was done and a biopsy taken from the liver. No evidence of splenic or portal vein obstruction was found. The post-operative recovery was uneventful and the blood picture showed marked improvement with the red-cell count increasing in three days to 4,000,000, the white-cell count to 6,300 with a normal differential and the thrombocytes to 300,000/cu. mm. The changes in the hemogram after splenectomy are shown in the table. The treatment during this postoperative stage included liver extract, pentonucleotide and iron, more on an empirical than a rational basis. The child was discharged on September 23, 1945, forty-one days after the second admission. Repeated blood counts taken on weekly visits to the out-patient department since discharge have been normal. The boy is steadily gaining weight and his general appearance is much improved.

TABLE 1

E. M. # 43-5916

Date	RBC	Hb	WBC per cu. mm.	Platelets	Comment
	million per cu. mm.	*gms. %*			
7/ 3/45	2.0	7.0	1,800	absent	On admission
7/ 4/45	2.7	7.0	1,800	absent	Transfusion 350 cc. whole blood
7/ 7/45	2.4		1,600	0	Transfusion 150 cc. whole blood
7/11/45	2.5	6.0	2,300	4,000	
7/16/45	2.4		900	absent	Transfusion 175 cc. whole blood
7/20/45	2.5		1,300	60,000	
7/23/45	2.7		1,800	60,000	Transfusion 250 cc. whole blood
7/24/45	2.9		1,600	70,000	
7/28/45	3.4	9.5	4,700	150,000	Transfusion 275 cc. whole blood
7/30/45	3.6	8.5	4,300	100,000	Discharged
8/ 6/45	2.8	7.0	3,400	180,000	On Visit to OPD
8/14/45	1.9	6.5	2,900	10,000	Readmitted & Transfusion 250 cc. whole blood
8/18/45	1.6	5.5	1,600	30,000	Transfusion 250 cc. whole blood
8/21/45	1.8	7.5	3,200	30,000	Developed pneumonia
8/24/45	1.5	5.5	2,300	absent	Transfusion 500 cc. whole blood
8/25/45	2.1	7.5	3,200	20,000	
8/28/45	2.1	6.5	1,800	Very few	Transfusion 400 cc. whole blood
9/ 3/45	2.9	10	2,000	11,500	
9/ 5/45	3.4	11.5	2,000	35,000	Transfusion 400 cc. whole blood
9/12/45	3.8	11	2,400	120,000	Splenectomy and 475 cc.
9/13/45	3.5	11	4,000	120,000	Transfusion 250 cc. whole blood
9/15/45	4.0	11.5	6,300	300,000	
9/18/45	4.1	11.5	6,000	300,000	
9/20/45	4.0	11.0	5,000	380,000	
9/23/45	3.9	12	7,900	400,000	Discharged
10/ 1/45	4.6	11	7,300	500,000	Out-patient visit
10/ 8/45	4.5	13	9,000	450,000	Out-patient visit

PATHOLOGICAL REPORT

Liver. Sections showed marked swelling of the parenchymal cells which were pale staining and finely granular. There was slight hyperplasia of the

connective tissue with some leucocytic infiltration suggesting mild hepatitis. *Spleen:* The tissue generally was moderately congested. The capsule was slightly thickened. The Malpighian corpuscles were recognizable but considerably distorted, apparently by the irregular hyperplasia of the reticuloendothelial elements. There were also extensive areas of fibrosis and some foci of hemorrhagic infiltration. Scattered multinucleated giant cells were present.

These findings were compatible with those found in splenic neutropenia or idiopathic thrombocytopenic purpura.

Discussion

Dr. Mary Warner: On admission the patient presented the clinical picture of a blood dyscrasia—namely, extreme pallor and weakness, generalized lymphadenopathy, hepatosplenomegaly and purpuric manifestations. The initial and subsequent blood counts tended to support this impression. There was a persistent "pancytopenia" characterized by anemia, marked leukopenia and a thrombocytopenia. The initial diagnostic impression was either an aplasia or hypoplasia of the bone marrow. The most frequent cause would be the use of chemicals such as the sulfonamide drugs or those of coal tar derivatives. However, careful questioning of the parents failed to reveal any history of drug ingestion. The boy was under no medical treatment and had been in apparent good health a few weeks prior to admission. There was no infection present on entry to account for the pancytopenia. Another possibility was that of a leukemia—probably lymphatic or monocytic in type—which produces a marrow hypoplasia and a resulting pancytopenia. The presence of an excessive number of monocytes in the initial blood smears gave substance to the possibility of a monocytic leukemia but repeated blood counts failed to support this diagnosis. The sternal bone marrow biopsy was an important diagnostic aid. No leukocytic hyperplasia was present. The marrow was normal in all respects except for an increase in the number of erythroblasts. Leukemia thus became a remote possibility.

Having excluded the bone marrow as the primary source of the blood disturbance, attention was then centered upon the spleen. The spleen in certain conditions can cause an inhibitory effect upon the marrow resulting in diminished delivery of the cells and platelets into the peripheral blood. Therefore the splenic anemias such as Banti's disease, hypersplenism, "splenic neutropenia" were included now in the list of diagnostic possibilities. These syndromes or symptom-complexes are closely related and difficult to distinguish one from the other and in fact may be of the same etiology but varying in degree. In Banti's disease which is chronic and slowly progressive the hemorrhagic tendencies are not usually those of a

purpuric character but due to hemorrhages from mucous surfaces and arising from gastric or esophageal varices. The liver undergoes cirrhotic changes. The liver function tests in this case were negative for any impaired function. This had little significance, however, as the disease was fairly recent in onset and the liver damage would not as yet be demonstrable if it were an early Banti's disease. Yet against the symptom-complex of Banti's disease was the rapid course displayed in this patient.

Our patient failed to show any sustained improvement with repeated transfusions. His anemia and leukopenia became on a few occasions quite marked. Thrombocytes were frequently absent and there was the danger of severe internal or cerebral hemorrhages. Also an intercurrent infection almost proved fatal. With all the factors considered and a diagnostic conclusion that we were dealing with a hypersplenism of unknown origin, splenectomy was decided upon and the spleen removed. At operation the splenic vessels and portal system were carefully examined and no evidence of any thrombosed vessels or obstruction was found. The absence of splenic or portal vein obstruction, together with the absence of esophageal varices suggest that this case represented a more benign type of congestive splenomegaly and the disease process probably resided within the spleen itself.

Following splenectomy there was a decided increase in the formed elements of the blood within two to three days. Fortunately, there was no inordinate secondary thrombocytosis. The hemogram has maintained itself within normal limits without transfusions and the general appearance of the boy is greatly improved. At the time this is written there has been a hiatus of 5 weeks since splenectomy and normal counts are still obtained. It is probably too soon to state that the patient has fully recovered.

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HIRSCHSPRUNG'S DISEASE

Case Report No. 36

Dr. Sally McDonald: H. T.—45-6344

H. T., a 9 year old colored female was admitted to Children's Hospital with the chief complaints of an abdominal mass and diarrhea. Two months prior to admission the patient had two episodes of diarrhea which were checked by lime water. During the past several months the child had complained of easy fatiguability and during this interval there had been a weight loss of eighteen pounds. One week prior to admission the abdomen became swollen and the child experienced intermittent episodes of abdominal pain. Also there was a recurrence of the diarrhea at this time. Anorexia was present for one week prior to hospitalization.

The past history was negative except for recurrent constipation and occasional abdominal enlargement which was alleviated to some degree after the administration of a laxative. The patient is an orphan and has been under the care of her present guardian for 3 years which is the duration of the known history.

Examination on admission revealed an enlarged abdomen which was distended and tympanitic above the umbilicus and dull to percussion below the umbilicus. A large mass, irregular in outline and freely movable was palpable in the midline. There was no associated tenderness or pain. On deep palpation an impression was left in the mass. Rectal examination presented a massive fecal impaction. The physical examination was otherwise negative.

The clinical impression was that of a Hirschsprung's Disease with secondary fecal impaction.

A flat plate of the abdomen revealed gas distended loops of small bowel suggestive of partial obstruction. The entire mass was subsequently noted to shift in position and to change in shape. Only by a starvation period, removal of fecal material manually, and repeated enemas was the mass reduced sufficiently to make possible an examination of the colon by means of a barium enema. The latter was reported as showing a marked dilatation of the rectum and sigmoid and a redundancy of the distal descending colon. This was thought to be compatible with a megacolon.

Following the barium enema report the patient was started on a regime of 0.5 mgms. of prostigmine sulfate subcutaneously daily, an enema on alternate days, a low residue diet and magnesium sulphate ½ oz. at bedtime. The prostigmine sulfate was increased to three times daily and maintained for four days when a spontaneous bowel movement occurred for the first

time since admission. An enema was given the following morning and a spontaneous bowel movement occurred at 6 p.m. that day. No further

FIG. 1. HIRSCHSPRUNG'S DISEASE

Note marked dilatation of the rectosigmoid

enemas were necessary. Six days after the first spontaneous bowel movement a loose stool occurred at which time mineral oil, 1 oz. daily, was substituted for the magnesium sulfate.

After a two week trial with prostigmine, it was discontinued and the patient was started on mecholyl bromide (Acetyl Beta-Methylcholine

FIG. 2. SAME CASE OF HIRSCHSPRUNG'S DISEASE AFTER TWO WEEKS OF MEDICAL THERAPY

Patient has shown marked clinical and roentgenological improvement

Bromide Merck) 0.1 gm. daily by mouth. Satisfactory regulation ensued and the child has had one to two bowel movements a day since then.

At the present time the patient is being maintained on a daily regime including 0.1 gm. of mecholyl bromide orally given 45 minutes after breakfast to prevent nausea, a low residue diet, and mineral oil.

Discussion

Dr. Frederic G. Burke: Hirschsprung's disease or congenital hypertrophic dilatation of the colon is a disease which begins in intrauterine life or during the first few months of extrauterine existence when the symptoms usually become manifest. This disease is characterized chiefly by dilatation with hypertrophy of the pelvic colon, the sigmoid, and sometimes the descending colon. Occasionally the entire colon may show involvement but more commonly the disturbance is retrograde beginning with the distal portion of the large bowel. Peculiarly, males are more frequently afflicted than females in the proportion of three to one.

True Hirschsprung's disease must be differentiated from acquired megacolon which results from chronic obstruction eventuating in dilatation and hypertrophy. There are many causes of acquired megacolon but the etiology of true Hirschsprung's disease is somewhat vague although probably neurogenic in character. Acquired megacolon may result from extreme mobility of the sigmoid with an unusually long mesosigmoid or because of the too great length of the tube itself. Actual blocking of the fecal current from atresia of the anal canal, rectum or sigmoid, from a partial anal obstruction, hypertrophied Houston's valves or over-development of O'Beirne's sphincters are other possible causes of an enlargement of the colon. In true Hirschsprung's disease there is a congenital imbalance between the parasympathetic enervation on the one hand and the sympathetic impulses on the other. Developmentally there is either a decrease of the parasympathetic control or else an increase in the sympathetic stimulation of both the bowel wall and the internal anal sphincter.

Approximately 33% of all true megacolons show involvement of the sigmoid portion of the colon alone, which may have a diameter many times its normal size and be greatly lengthened so that it folds and re-folds upon itself, filling the pelvis and greater part of the abdomen and crowding the small intestines up under the liver, stomach and spleen. The external coat of longitudinal fibers which in the normal colon constitute the longitudinal bands are either absent or are poorly defined. The middle coat of circular fibers is hypertrophied. The inner coat of muscular tissue may be of a normal thickness as may the mucosa but the latter usually shows signs of chronic inflammatory changes such as hypertrophy, focal necrosis ranging from minute fissures to large ulcerated areas sometimes extending through the muscular layers and occasionally even penetrating the serosa. If there is a great deal of fecal matter within the bowel when the abdomen is opened

the serosa will be found to be blanched due to the pressure on the mesenteric vessels which are long and tortuous within an unusually lengthy mesocolon. The lymph glands may be found hard and cystic in the presence of chronic lymphangitis as is evidenced by the thickened mesocolon.

There are three major manifestations of Hirschsprung's disease: (1) The history of constipation from birth; (2) Abdominal distension; (3) X-ray evidence of dilatation of the lower portion of the colon by means of a barium enema. Other symptoms and signs are; inanition, weakness of the extremities, anemia, retardation of growth and development, hypertonicity of the anal sphincter, fecal impaction, and toxic manifestations such as headache, nausea, vomiting, lassitude and irregular fever.

The differential diagnosis consists of rickets, tuberculous peritonitis, volvulous, regional ileitis, cysts, malignancies and functional obstinate constipation. The most common cause for a differential diagnosis of this disease is acquired megacolon secondary to some obstructive feature of the bowel and for this reason every effort should be made in this type of case to rule out some mechanical cause for the disease. There are many cases that would probably be best called "border line" megacolons because for one or other reasons they do not classically conform to the complete picture and probably more cases of this type are seen in practice than of true Hirschsprung's or advanced "secondary" megacolon. Most of this latter group of cases probably results from functional obstipation associated with lazy bowel habits.

The treatment of Hirschsprung's disease is primarily medical, surgery being reserved for the cases that fail to improve only after a clear demonstration that an intelligent and comprehensive regimen of medical therapy has failed to relieve the symptoms. It is probably advisable to employ a medical regimen for at least two years in many cases before resorting to the more radical approach. A recommended medical regimen consists of a low residue diet, high in protein content, moderate carbohydrate with a minimum amount of fat. High vitamin supplements are employed empirically and at the onset of treatment the daily use of laxatives such as milk of magnesia along with nightly enemata of physiologic saline solution are advised. Importantly the defecation reflexes are encouraged by insistence of parents in placing the child "on the pot" for 15 minutes after each meal; this practice stimulates the natural gastrocolic reflex. Parasympathetic stimulants have considerable virtue and such drugs as Prostigmine, Mecholyl and Physostigmine are employed three times a day. Some authors have reported success with the alternate use of parasympathetic with a sympathetic stimulating drug such as Syntropan.

Spinal anesthesia has been recommended as a mode of treatment and as a test of the possible efficacy of neurosurgery. This procedure knocks out the

sympathetics for a varying period of time and produces in effect a functional sympathectomy. Following the use of lumbar sympathectomy for spastic paralysis of the extremities Royle and Hunter noted the beneficial effect on the bowel. Many still believe this to be the treatment of choice for megacolon and claim a minimal operative mortality rate with cures ranging up to 75%. In long standing cases excision of the lower bowel has been employed but it is doubtful whether the disease is worse than this cure. Anal divulsion and anal incision and attempts to resect the involved portion of bowel with an anastomosis of apparently uninvolved portions have been largely discarded.

The prognosis of these cases varies considerably in the different series that have been reported and the mortality rate has been stated to be from 70% to 85% before the twenty-first year in poorly managed or incompletely managed cases. The majority of individuals with this disease will respond to adequate medical with possible adjunctive surgical therapy and will pursue a relatively normal life.

CLINICO-PATHOLOGICAL CONFERENCE

Directed by Dr. E. Clarence Rice

Assisted by—Dr. Robert Sullivan

LYMPHOBLASTOMA

Case Report No. 37

Dr. Robert Sullivan 40-7153 A

A two months old colored male was admitted to Children's Hospital because of anorexia, vomiting and marked restlessness.

The child had a normal birth at Freedman's Hospital. During the eighth month of the mother's pregnancy it was found that she had a positive Wassermann, following which she received one intravenous and several intramuscular anti-luetic heavy metal injections. The mother had six children by a previous marriage, the oldest fifteen and the youngest seven years of age. These are said to be syphilitic. The father of the patient has had repeated negative Wassermans.

The essential findings were a weak, undersized colored infant, with a slightly bulging fontanelle, a suggestive nuchal rigidity and positive Kernig's sign, puffy eyelids, a loud blowing systolic murmur at the apex, and a distended abdomen. The red cell count was 3,000,000 with 9.0 grams of hemoglobin. A subsequent red cell count showed 1,400,000 erythrocytes with 3.5 grams of hemoglobin. There were 10,000 leucocytes of which 5% were staff forms, 33% polymorphonuclears, and 62% lymphocytes. A repeat differential white cell count revealed 99% mononuclear cells of which 28% were lymphoblasts or myeloblasts, and 35% were lymphocytes and prolymphocytes. The thrombocytes were nearly absent. Other blood counts were essentially the same. Sickle cells were not found.

The spinal fluid contained 340 cells with 85% polymorphonuclears. The sugar was normal and the Wasserman and bacteriological examination were negative.

Roentgen examination revealed no evidence of abnormalities of the thoracic contents. There was definite evidence of periostitis and metaphysitis of all the bones of the upper and lower extremities without involvement of the epiphyses. The ribs, scapulae and clavicles had a moth eaten appearance and the tenth, twelfth, and first lumbar vertebrae were affected but not the intervertebral disks.

Blood chemistry examination, including calcium and phosphorus, were within normal limits except serum protein which was 5.0 grams per cent. Numerous Kahn and Wasserman tests were negative.

The temperature was elevated at times to 101 and fever, when present, was of a sustained type. Treatment was supportive but the course was steadily downhill and death occurred on the forty-third day of hospitalization. The clinical diagnosis was congenital syphilis and leukemia.

FIG. 3. X-RAY OF THE LONG BONES OF THE LOWER EXTREMITIES SHOWING MARKED MALIGNANT INFILTRATION OF THE BONES RESEMBLING IN MANY FEATURES THE CHANGES FREQUENTLY ASSOCIATED WITH CONGENITAL SYPHILIS

At autopsy the brain appeared normal though moderately congested. The liver weighed 210 grams (normal—96 grams) and it was purple-gray and firm. The surface and parenchyma were studded with many firm grayish yellow nodules varying in size from one to fifteen millimeters in diameter. Upon the surface these nodules were elevated and umbilicated.

The spleen was essentially normal. The retroperitoneal lymph nodes were enlarged, firm and securely adhered to the tissue about the aorta. The long bones showed hyperplasia of the marrow with evidence of periostitis or subperiosteal infiltration. There was moderate osteoporosis of the tenth and twelfth thoracic vertebrae. Examination of the brain, spinal cord and meninges was essentially negative.

Discussion

Dr. E. Clarence Rice: The principal microscopic changes were noted in the liver, lymph nodes, bones and spleen. In the liver these tumor masses were circumscribed. No fibrous capsule was present, although a syncitial stroma was evident, being most marked in the interior of the neoplasm. An occasional bile radical was seen. The cells making up the tumor masses were rounded and somewhat variable in size, the protoplasm being scant, the nucleus fairly clear and somewhat granular showing the presence of nucleoli. Some of the cells were in mitosis. The surrounding liver tissue revealed no very definite change. Silver stained sections did not disclose spirochaetes. The lymph nodes were similarly involved by the same type of malignant cells found in the liver; however, fibrosis was marked in some and numerous eosinophiles were present. The follicles of the spleen appeared to show some involvement. The bone changes were evidently due to metastatic involvement, the marrow containing a high percentage of monomuclear cells which probably were the same as those found in the liver.

Sections from the lesions in the liver have been submitted to a number of pathologists and all agree that the process is a malignant one. The various opinions expressed favored lymphoblastoma, endothelioma and Hodgkin's lymphogranuloma. None thought that the diagnosis was leukemia. The blood picture simulating the aleukemic phase of leukemia was due to the replacement of the marrow elements by the tumor cells. There was nothing in the postmortem examination to account for the pleocytosis noted in the spinal fluid.

I am inclined to believe that we were dealing with a malignant endothelioma. Doctor Lindsay favored the diagnosis of lymphoblastoma. We cannot recall seeing any similar condition in a child of this age.

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CLINICAL PROCEEDINGS OF THE CHILDREN'S HOSPITAL

Washington, D. C.

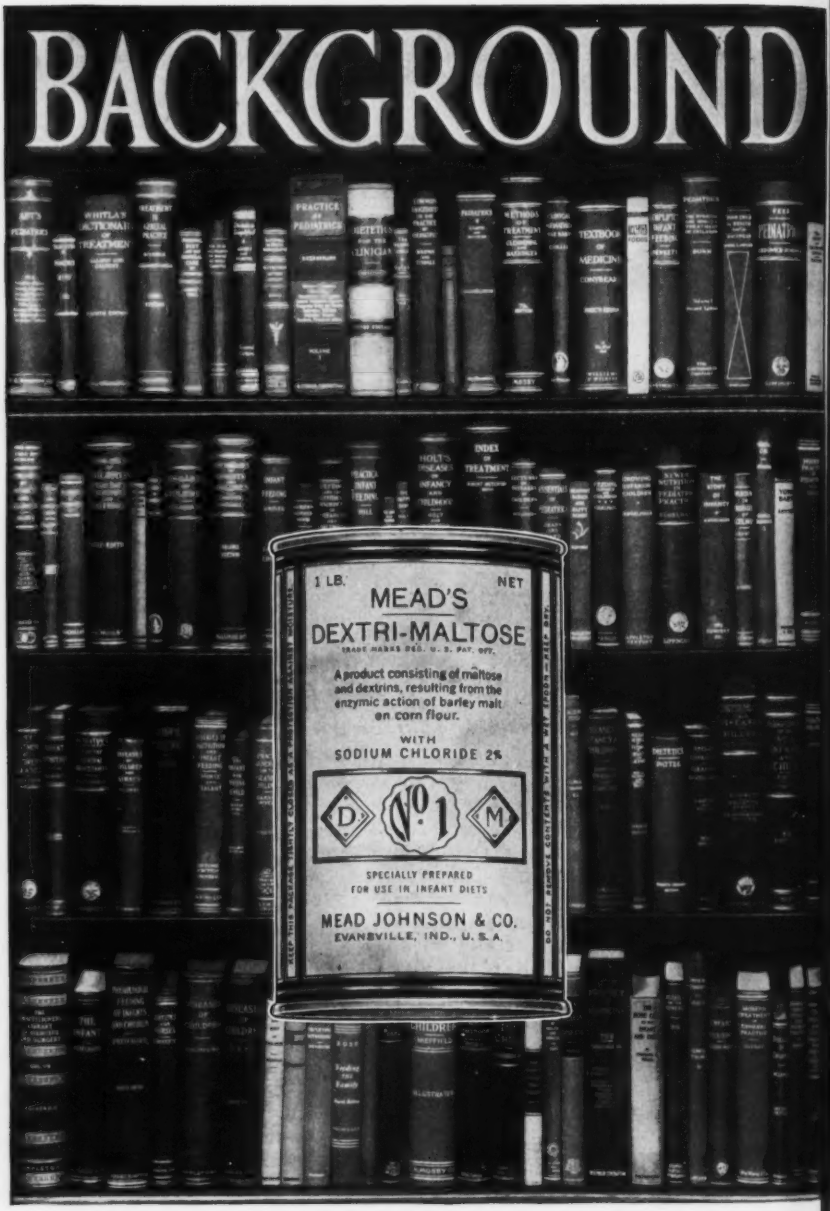
Published monthly by the Staff. Cases are selected from the weekly conferences held each Sunday morning at 11:00 A.M., from the Clinico-pathological conferences held every Tuesday afternoon at 3:00 P.M., and from the monthly Staff meetings.

Occasionally, the remarks and observations of guest speakers are included in this bulletin when thought to have particular interest. The proximity of the Children's Hospital to the Medical Centers of the Army, Navy and United States Public Health Service affords us the opportunity to invite many distinguished physicians to our conferences.

This bulletin is printed for the benefit of the present and former members of the Attending and Resident Staffs, and the clinical clerks of Georgetown and George Washington Universities.

Subscription rate is $1.00 per year. Those interested make checks payable to Mrs. Olive Tabb, Executive Secretary, The Children's Hospital, Washington, D. C.

BACKGROUND



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